

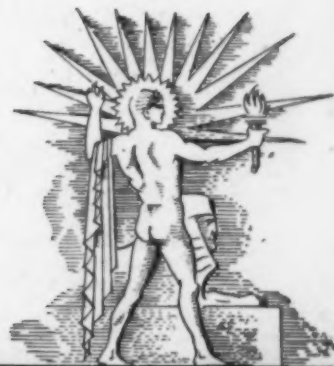
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SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE



OCTOBER 8, 1932

Autumn Ennobles Even Weeds

See Page 225

SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

VOL. XXII

No. 600

The Weekly
Summary ofCurrent
Science

Published by

SCIENCE SERVICE

The Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by WATSON DAVIS

Subscription rates—\$5.00 a year postpaid; two years, \$7.00; 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Back numbers more than six months old, 25 cents.

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Advertising rates furnished on application.

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Publication Office, 1930 Clifton Ave., Baltimore, Md. **Editorial and Executive Office,** Constitution Ave. at 21st St., N. W., Washington, D. C.

Address all communications to Washington, D. C.—Cable address: Scienservc, Washington.

Entered as second class matter October 1, 1926, at the post-office at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. and Canadian Patent Offices.

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DO YOU KNOW THAT

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Property loss per capita from fires in America is almost double what it was twenty years ago.

Some kinds of bananas that grow in the Orient are so rich in starch that they are used for meal.

In the region of the West Indies are found the largest American eels, that grow to be as long as seven feet.

Art objects imported into Germany are now fumigated, lest they contain insect pests or molds which might damage other art treasures.

A government biologist has received a prize of \$100 for a humane trap which captures and holds birds and animals without injury to them.

For its courtship, the Australian bower-bird builds a bower of arched twigs in the forest and gaily decorates it with bright shells, feathers, and flowers.

The difficult journey across the Sahara desert, a distance of 1,700 miles from north to south, has been achieved by two young Englishmen in a little over four months.

Florida may add limes to her citrus fruit products, if experiments prove commercially profitable.

Berries of some sumacs are used as food in Japan, but some other species of sumac are poisonous even to the touch.

A scientist finds that the quantity of wool produced by a sheep depends to a considerable extent on the feed the sheep gets.

Mutton is the principal meat of the Navajo Indians from childhood, and they show little interest in a change of meat diet.

Storm-warnings are telephoned or telegraphed by the U. S. Weather Bureau to more than 300 points, including all important ports.

Comparing the teeth of modern college students and primitive Indians, two University of California professors found in the students a tendency toward increase in the overbite of the upper front teeth: in other words, the human race is apparently becoming more "ratty," in its profile.

WITH THE SCIENCES THIS WEEK

Curiosity arousing questions for the teacher and general reader. Book references in italic type are not sources of information of the articles, but are references for further reading. Books cited can be supplied by Librarian, Science Service, at publisher's price, prepaid in U. S.

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What is thought to be the "simplest system" from which cosmic rays may be emitted? p. 223.

PLANT PHYSIOLOGY

What are carotinoids and anthocyanins? p. 229. *The Green Leaf*—D. T. MacDougal—Appleton, 1930, \$2.

PUBLIC HEALTH

In what part of the country are breeding aviaries infected with psittacosis? p. 224.

Should the cancer death rate be high or low in a country with poor health facilities? p. 225. *Cancer*—Willy Meyer—Hoebner, 1931, \$7.50.

SEISMOLOGY

When did Knossos thrive? p. 235. *Our Mobile Earth*—Reginald A. Daly—Scribner's, 1926, \$5.

PHYSICS

Cosmic Rays May Be Emitted When Magnetic Poles Combine

In New Explanation Dr. Langer Reasons How Proton, Neutron, Photon and Radioactive Phenomena Can Arise

A NEW explanation of the origin of the cosmic rays is given by Dr. R. M. Langer of the California Institute of Technology at Pasadena in a short report in the current issue of *Science*.

Dr. Langer enunciates a new theory of the fundamental particles of nature, building on the observations of Dr. Carl D. Anderson that indicate the probable existence of a positive electron (SNL, Sept. 24, 1932, p. 197) and using the theory of Dr. P. A. M. Dirac, British physicist, who postulates positive and negative magnetic poles as fundamental entities.

Starting with the electron and the Dirac magnetic pole as the fundamental particles, Dr. Langer reasons how the proton, neutron, photon and radioactive phenomena can arise.

Thousand-Million-Volt Energy

He pictures the neutron, the particle discovered earlier this year, as built of a positive and negative magnetic pole. Using the equations of Dr. Dirac, he finds that the two poles combined have an energy corresponding to a mass approximately that of the proton, which is also believed to be that of the neutron. In the transformation there is an energy difference of a thousand million volts and since this is of the order of the cosmic rays, Dr. Langer suggests that it is the "simplest system so far considered which could explain the emission of cosmic radiation."

To obtain a proton, Dr. Langer combines the neutron with the positive electron, of mass equal to the familiar negative electron, which was suggested by Dr. Anderson. The negative electron of the neutron is cancelled out by the positive electron, which leaves the proton.

Vanishing Mass

Dr. Langer further suggests that the photon or the sub-atomic unit of light may be formed through the combination of the two kinds of electrons, with a vanishing of mass and a velocity of light. Another possibility suggested is

that the photon may be constructed of a positive and negative electron very close together.

Dr. Langer is on the staff of the Norman Bridge Laboratory of Physics of which Dr. R. A. Millikan is director. Dr. Anderson is in the same laboratory. Dr. Langer was one of those who suggested the existence of the neutron which was experimentally discovered this year in Europe.

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BACTERIOLOGY

Milk Pasteurized by Conducting Electricity

YOU MAY BE drinking milk these days which has been pasteurized, not by heat from fire, but by an electric current passing through it. For apparatus which guarantees the safety of milk in this electrical manner has been installed in seventeen plants in six states and two foreign countries, and has a daily output of approximately 30,000 gallons, Prof. C. G. King of the University of Pittsburgh reported to the Electrochemical Society.

Because of its mineral salts, milk readily conducts electricity. At the same time the liquid offers enough resistance

ARCHAEOLOGY

Hippodrome Big As Football Stadium Found in Antioch

THE PEOPLE of ancient Antioch had a hippodrome big enough to take rank with famous football stadiums of today, it appears from a report on the latest discoveries by archaeologists excavating the ruins of Antioch. Prof. George A. Elderkin of Princeton, leader of the joint expedition to Antioch, has prepared the report.

Antioch's hippodrome had a capacity

to the passage of current to cause the electricity to give up heat to the milk.

"The possibility of an electrical or electrochemical effect upon bacteria in addition to the heat effect has been considered," Dr. King said, "but at present there is no clear evidence from which the question can be answered. Uniform heating accounts for the major effect, however, and it therefore seems preferable to consider tentatively the entire bacterial effect due to heating."

Tests by state health officials for organisms responsible for disease were said to have proved the efficiency of the process.

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PHOTOGRAPHY

Plates For Star Pictures Should Be Kept on Ice

LIKE EGGS and sausage, photographic plates should be kept in the refrigerator if their quality is to be preserved at its best. This recommendation is made by Dr. C. E. K. Mees, director of the Eastman Kodak Company's research laboratory at Rochester, in regard to plates intended for astronomical purposes.

Several large observatories, he says, have already adopted the practice of keeping their unexposed plates on ice. The lower the temperature, the more slowly do changes in the emulsion take place. The result is that those placed in the refrigerator as soon as possible, and kept there until used, are more uniform in their performance than those that have been subjected to a variety of temperatures. For ordinary photography, the lack of uniformity would hardly be noticeable.

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of 80,000 persons, it is announced. From this, it would compare in size with the Rose Bowl at Pasadena and the Yale University Bowl.

The expedition, which is spending five years excavating Antioch, is a joint project of the Baltimore Museum of Art, the Musée Nationaux of Paris, the Worcester Art Museum, and Princeton University.

A special study of the Antioch hippodrome, by Prof. W. A. Campbell of Wellesley College, reveals that the structure was built in the fourth century and was abandoned in 526 after it was destroyed by an earthquake. The arena enclosed an area shaped somewhat like a football stadium, though twice as long in proportion to width. A slight curvature in the sides was designed, Prof. Campbell believes, to provide the charioteers an opportunity to maneuver for position after the turns. Destruction of the hippodrome was so complete that only the base remains.

Antioch had another stadium, the expedition discovered. Remains of this one, made of brick and stone, have also been excavated.

Among other discoveries, Prof. Elderkin describes a terra-cotta tomb in a Roman cemetery. In this tomb lay the skeletons of a man and woman so placed as to indicate that when the couple were buried the woman's head lay upon her husband's shoulder.

"Such an intimate grouping," writes Prof. Elderkin, "is, I believe, without parallel."

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EVOLUTION

Dogs Are Just Beginning Evolutionary Loss of Toes

FIVE FINGERS or toes on each hand or foot are so usual that it is necessary to look carefully at a horse, cow, sheep or dog to realize that all animals are not similarly equipped. The horse has only one toe which is his hoof, the cow and sheep have cloven hoofs or two toes, and most dogs lack the big toes of the hind feet. But the common ancestor of all the mammals had five digits on each extremity, like man. This is known from skeletons of prehistoric animals and a comparative study of the anatomy of living animals. Missing toes have been lost in the evolutionary process.

Prof. Charles R. Stockard of Cornell University Medical School has studied inheritance of fingers and toes to throw light on the way in which evolution operates. He now has evidence that the big toes of the hind feet disappeared or degenerated first. Then the thumb of the hand or front foot was lost. Next the little toe of the hind foot and then the little finger or toe of the hand or front foot became rudimentary, and so on.

The dog in most breeds has five toes on the front feet and only four on the hind feet. It is just beginning to undergo evolutionary loss of digits. Prof. Stockard cross-bred pure line great Danes never known to have hind feet big toes with unusual St. Bernards with great toes. As a result the hybrids all had big toes and in this respect evolution was reversed.

Some were so enthusiastically big-toed that the big toes were doubled. This happened so frequently that Prof. Stockard concluded that this doubling, or

growing of six toes where five might be expected, is a sign that evolution is about to discard the toe. The doubling of a digit is strangely enough an indication of weak or poor development and not strength.

Six fingers or toes on human beings caused by doubling of fingers or toes is not rare, for medical literature records many instances. Taking this in connection with the doubled toes in his dogs, Prof. Stockard reads in this a forecast of evolution's intention. He ventures a suggestion:

There is a possibility that the human hand of the future may possess fewer fingers.

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PUBLIC HEALTH

Parrots Quarantined In Infected Areas

DON'T make friends with any parrots, love birds or parakeets from California unless they have a certificate from a health officer declaring them free from parrot fever.

This warning has been issued by Surgeon General Hugh S. Cumming of the U. S. Public Health Service. It is intended to protect people from psittacosis, or parrot fever. If they fail to heed the warning, they run a good chance of getting this serious, often fatal disease.

Some of the breeding aviaries of Southern California, where birds of the parrot family are raised, are infected with psittacosis, an officer of the U. S.

Public Health Service found in a study undertaken at the invitation of the California State Department of Public Health. Birds from these aviaries may give the disease to unsuspecting bird owners and friends.

So, to protect the health of people all over the country the Surgeon General has issued his warning. But he has done more than warn. Upon his advice, Secretary of the Treasury Mills has just amended the interstate quarantine regulations so as to prevent birds from infected areas being shipped for sale beyond the borders of the state.

By Secretary Mills' order, the interstate transportation of birds of the parrot family by common carriers is now limited to those birds certified by the proper health authority of the State as coming from aviaries free from infection. Bootlegging of the birds is expected, however.

In Southern California, and particularly in Los Angeles, these birds are often raised in private families by ladies wishing to make pin money. Many of the birds are peddled from house to house. One case of psittacosis in Oregon was traced to a California love bird sold in this way.

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CHEMISTRY

Appearance of Age Sprayed on Copper

THE PLEASING green coloration that copper and its alloys assume after years of exposure to the weather has been considered as reliable an indication of age as the wrinkles and gray hair of an old man.

This is no longer true. A preliminary treatment with chemicals can now be used before installation to turn the freshest copper roof or spire into one of venerable appearance with pleasing patina or verdigris. Two Waterbury, Conn., metallurgists, John R. Freeman, Jr., and P. H. Kirby, have worked out a method for rapid development of patina on copper.

Discovery of the method of making artificial patina was delayed because a false conception as to chemical composition of patina had existed. Authorities had considered the patina to be a basic copper carbonate while analyses of green coloring matter on New England copper roofs from 78 to 16 years old showed that patina consists practically wholly of basic copper sulfate. In England also basic sulfate was found to be

the cause of rich green color on old copper roofs. Sulfur dioxide put into the air from burning coal provides the sulfur that reacts with the copper to form the patina.

But even badly polluted industrial atmospheres require 10 to 14 years to develop patina by natural weathering. Architects demanded a quicker action green coloring method.

A ten per cent. solution of specially conditioned ammonium sulfate was finally hit upon as the effective coloring chemical. After suitable treatment with this solution copper can be made to acquire a patina in 24 hours that compares with nature's product of 10 to 14 years of exposure. The complete process is described in *Metals and Alloys*.

In England success in forming patina by electrolytic methods has been reported and that process is said to take only fifteen minutes. Dr. W. H. J. Vernon of the British governmental Chemical and Research Laboratory at Teddington found that an ammonium sulfate solution treatment that he perfected breaks down under severe weather conditions and he therefore turned to an electrolytic process.

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PUBLIC HEALTH

Cancer Increases As Other Diseases Decrease

INCREASE in cancer is real and is due to two factors. In the first place, more people are escaping the hazards of youthful diseases and are living to the age at which cancer attacks. Second, and even more important, more of these people who live to the so-called cancer age are being saved from dying of other diseases, such as pneumonia, which formerly took a large toll at cancer age.

These conclusions, based on a study of Canadian vital statistics, were reached by Dr. Madge Thurlow Macklin, of the University of Western Ontario Medical School, at London, Ont. They were made public in the *American Journal of Cancer*.

Dr. Macklin compared death rates from cancer and from all causes in Canada at various age levels since 1901. She found that as public health measures decreased the prevalence of preventable diseases like smallpox, yellow fever,

malaria, diphtheria, and tuberculosis, the age of the population changed. More people now live to be over 40 years than did in 1901. At the same time the cancer deaths increased, not only in the general population but in the older age groups.

"The cancer rate might justifiably be used as an index of the state of preventive medicine and sanitation in a country," she stated. "Those with good public health organizations have a high cancer rate; those with a low cancer rate show poor public health facilities."

"Not only does preventive medicine bring more people to the cancer age, but it keeps them from dying of preventable causes after they get there, so that it is inevitable that the death rate from some few diseases, not preventable at present, will mount," she explained.

That Dr. Macklin is not unduly discouraged by her findings is evident from a concluding sentence, the philosophy of which should prevent people in general from taking a too gloomy view of the situation.

"We must all die of something," she pointed out, "and it is inevitable, as we eliminate one cause of death after another, that we increase the death rate from the causes that remain, for while we may increase the length of life, we do not decrease the certainty of death."

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BOTANY

Autumn Brings Nobility Even to Cornfield Weeds

See Front Cover

AUTUMN is the time of the Truce of God. Even as a beggar may assume a certain dignity when he is about to die, so the commonest weeds often take on beauty when all things pause to make last salute to the retreating sun, before the *hora novissima* of the first heavy snowfall. For the cover picture of this issue of the SCIENCE NEWS LETTER, Cornelia Clarke has made a camera study of four seed-heads of the common velvet-leaf, *Abutilon theophrasti*, that has most sympathetically captured something of its air of a Villon repentant.

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SOUVENIR OF THE ECLIPSE

Many astronomers sought in vain at the Aug. 31, 1932 total eclipse of the sun for a likeness of the phenomenon so well reproduced here. This picture was taken at Fryeburg, Me., by Dr. Heber D. Curtis, director of the Observatory of the University of Michigan, Ann Arbor, Mich. Dr. Curtis used a camera of 40-foot focal length and exposed the film for 34 seconds.

ASTRONOMY

Mythology in the Sky

Great Square of Pegasus Becomes Prominent, Bringing To Mind Legends of the Naming of Many Constellations

By JAMES STOKLEY

TO THE SOUTHERN evening sky in October there comes what is without doubt one of the most familiar of star groups—a figure that makes an excellent guide from which to start a study of the autumn constellations. This, the so-called "Great Square in Pegasus," is a rather inappropriate name. Only three quarters of the square are in Pegasus, the winged horse. The fourth star is in the adjoining constellation of Andromeda.

About nine o'clock this evening look high in the south, and there you will see this figure, as indicated on the map. Four stars of nearly similar brightness that form a good square make it easy to identify, even though none of the stars is of the first magnitude. The most brilliant is Alpheratz in the northeast corner. This is the star that is not in Pegasus but in Andromeda. Its magnitude, as determined by accurate astronomical measurements, is 2.15. Diagonally opposite, Markab is the next brightest of magnitude, 2.57. Only slightly inferior, hardly enough to be detected with the unaided eye, is the star directly above it, Scheat, whose magnitude is 2.61. Algenib, below Alpheratz, is the faintest of the quarter; 2.87 is its rating.

The other naked-eye stars in Pegasus are fainter than these. One set extends westward from Scheat. These form the forelegs of the mythical flying horse. The others extend from Markab, and according to the ancient fancies outline the animal's neck and head. Thus, as Pegasus appears in the sky for us in the northern hemisphere, he is upside down.

Story of Andromeda

Andromeda and the neighboring constellations, as well as Pegasus, are connected in mythology. The winged horse sprang into being from the blood of the Medusa when her head was struck off by Perseus. About this time Cassiopeia, queen of Ethiopia, of which Cepheus was king, boasted that she was more beautiful than the sea nymphs. This so annoyed Neptune that he sent a sea monster to ravage the coast of Ethiopia.

When the oracle of Ammon was appealed to, she announced that the princess, Andromeda, would have to be chained to a rock on the coast and sacrificed to the monster, who would then spare the country. These instructions were followed, but before Andromeda was devoured Perseus arrived (not mounted on Pegasus, though some apocryphal versions of the legend have it so). Perseus slew the monster. Then he married Andromeda, even though she was betrothed to Phineus. This led to a battle royal at the wedding, in which the unsuccessful suitor and all his cohorts were slain. Later Pegasus became the steed of another hero, Bellerophon.

The positions of Pegasus and Andromeda in the sky have already been mentioned and are shown on the maps. Immediately north of Andromeda is a constellation in the shape of a W. This is Cassiopeia, the queen, represented as seated on her throne. Above and to the west of her is a constellation of somewhat fainter stars forming a smaller square with a triangle attached to its northeastern side. This is Cepheus, the king. Below Cassiopeia, and to the left of the lower part of Andromeda, is Perseus. The sea monster is low in the southwest, represented by the constellation of Cetus.

Though some of these constellations are fairly conspicuous, none of them contains first magnitude stars. There

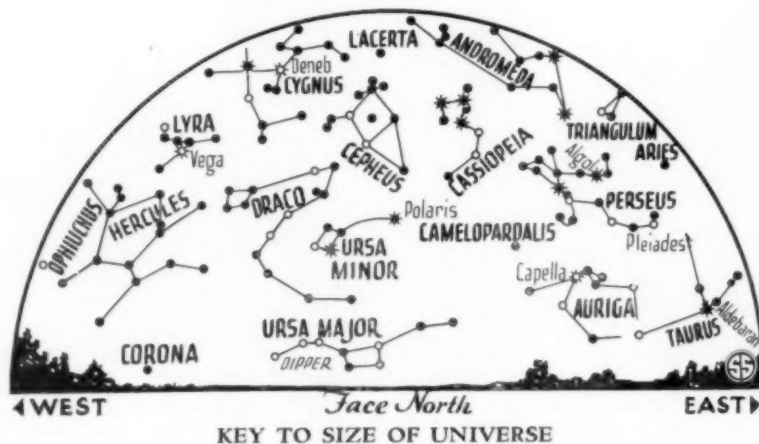
are, however, six stars of this brilliance in the October evening sky. Most brilliant of all is Vega, in Lyra, high in the west. Directly above is Cygnus the swan, sometimes called the northern cross. At the top of the cross is Deneb. To the southwest of Cygnus is Aquila, the eagle, containing the brilliant Altair.

Fomalhaut is another of the first magnitude stars now visible, and is low in the south. It is the only star of Piscis Austrinus, the southern fish, that can easily be seen from these latitudes. Just below Perseus in the northeast is Auriga, the charioteer, with Capella. Adjoining it, to the right, is Taurus, with the reddish bright Aldebaran marking the animal's eye.

First Sky Yardstick

And now let us return to Cepheus, which is this month in the best position of the year for observation in the evening sky. Though this constellation contains no very bright stars, it does boast of one which is among the most important bodies in the heavens—the first star to be discovered of a type which enables astronomers to plumb the greatest depths of the universe. This star is the uppermost one in the little square and is of the fourth magnitude, easily visible to the unaided eye, though not conspicuous. It is not bright enough to have a proper name, and is usually designated as delta Cephei. For this reason, stars like it are called Cepheids.

Delta Cephei is a variable star. This is not so remarkable, for many of the stars in the sky change periodically in



The little star at the top of the square in Cepheus, Delta Cephei, changes its brightness in such a way that astronomers use it as a yardstick of the heavens.

brightness. Some, like Algol, a famous variable in the constellation of Perseus, consist of two bodies, a bright and a dark one, which revolve around each other. At regular intervals the dark star eclipses the bright one. But delta Cephei is a variable of another kind. It brightens rapidly, then diminishes more slowly. It takes 5 days, 8 hours, 47 minutes and 39 seconds for it to make a complete change and return to its starting point. Furthermore, the spectroscope, which shows how a star is moving, reveals that when it is increasing in brightness, the star is approaching us, when diminishing, it seems to be receding.

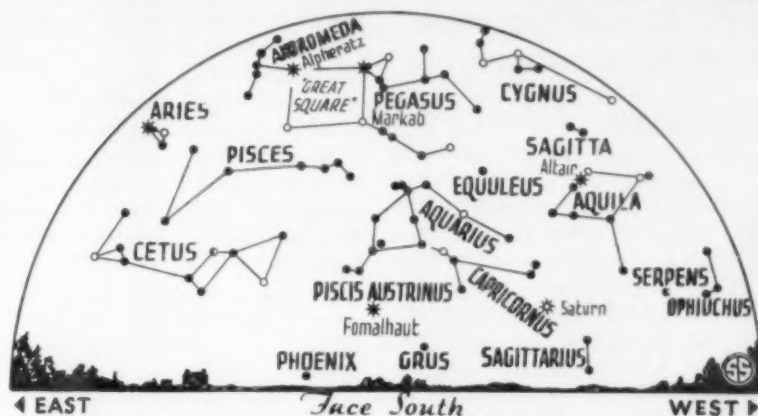
The most plausible explanation of this peculiar behavior is that the star is pulsating, a theory that was originally proposed by Dr. Harlow Shapley, director of the Harvard College Observatory, and which was later developed mathematically by the famous English astronomer, Sir Arthur Eddington. Thus the star does not really oscillate back and forth, towards and away from us, but the light that reaches us comes from the side towards the earth, which does so oscillate. The opposite side, which has the reverse motion, is invisible, and hence the apparent relation between motion and change in brightness.

But, interesting as this is, the most important thing about the Cepheid variable stars is a fact that was discovered by another Harvard astronomer, the late Miss Henrietta S. Leavitt. She found that the Cepheids vary greatly in the length of their period, ranging from fifteen hours to a hundred days, but that those of the same period have the same average brightness. Furthermore, she found that the longer the period, the greater is the average brightness.

Tell-Tale Brightness

The studies of Dr. Shapley showed that this relation holds good for all Cepheids, and he applied it to a measurement of their distances. Because of the characteristic way in which these stars change in light, a Cepheid can always be identified. Then the time it takes to go from maximum brightness through its cycle and back again can be measured, and the astronomer can tell how much greater or less its candlepower is than another with a different period. Perhaps it comes out a hundred times fainter than another one, but both appear the same brightness when seen through the telescope. Then it is obvious that the one with the longer period, and hence the greater intrinsic bright-

SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



SATURN ALONE IN EVENING SKY

The ringed planet is the only one that can be seen in the evening sky. Mars, Jupiter and Venus, however, are visible in the morning before sunrise.

ness, is much farther away than the other, for if they were of the same distance one would appear a hundred times as bright as the other. From these data can be calculated the relative distances of any two Cepheids. Now, if the distance of one particular Cepheid can be found independently, we have a means of telling the distance of any one of them.

This very thing has been done, for some of the Cepheids are close enough to permit a direct determination of their distance. In some of the most distant objects studied by astronomers, the spiral nebulae, stars have been found which show all the characteristics of Cepheids, and their brightness and distance have been measured. In this way the distances of two of these objects, which are galaxies of stars outside the limits of the one to which the sun and all the naked eye stars belong, have been found to be about a million light years—a million times the six trillion miles that a beam of light travels in a year. As newer and more powerful telescopes are completed, still more distant objects can be measured in the same way.

The planets are not as numerous in the evening sky this month as they have been recently, for only one is visible. This is Saturn, famous for its system of rings, which can be seen in the constellation of Capricornus, low in the southwest. On the twenty-second of the month it is in quadrature with the sun, which means that it is directly south as the sun is setting. The planet sets, therefore, at midnight. Three other planets, Venus, Mars and Jupiter, may be seen in the morning sky, before sunrise.

During October, first quarter of the

moon occurs on the sixth, full on the 14th, last quarter on the 22nd, and new on the 29th. Thus from about the fourth to the 16th, the evenings will be moonlit.

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BACTERIOLOGY

Bacteria Lived in Tube More Than 22 Years

GERMS that lived for twenty-two and a half years in a sealed tube have just been studied by Wilbur E. Deacon of the University of Nebraska. This is a long life for a group of germs growing on a nutrient medium in a tube. Ordinarily such groups of germs, called cultures, are discarded after a few weeks, or at most a few months, in favor of cultures of their descendants which bacteriologists believe to be more virile.

The germs which Mr. Deacon investigated were of the species called *Serratia marcescens*, formerly known as *Bacillus prodigiosus*. They do not cause disease, and grow on certain kinds of foods. Years ago when bread was baked at home in large batches and kept for weeks in damp storerooms, red spots appeared to trouble the housewife. The spots were caused by these bacteria.

In his report to *Science* Mr. Deacon described tests he had made and to which the germs responded in characteristic style, evidently none the worse for their many years of life in a test tube. The cultures had been made and sealed between 1903 and 1911 by the late Prof. H. H. Waite of the University of Nebraska.

Science News Letter, October 8, 1932

ASTRONOMY

Periodic Comet Discovered By Yerkes Astronomer

BROOKS' COMET, a periodic visitor to the vicinity of the sun, last seen in 1925, was sighted by Prof. George Van Biesbroeck of Yerkes Observatory, the astronomical clearing house at Harvard College Observatory has been notified.

It has reappeared in the heavens very close to the place that has been predicted for it from its past history. On Sunday, Sept. 25, the comet was in the constellation of Pisces, the fishes, which is in the southeastern evening sky. With a magnitude of 12, it is too faint to be seen without a fair sized telescope and its past history indicates that it will not become visible to the unaided eye.

Brooks' comet has a period of 7.1 years in its travel around the sun. It was last seen in 1925 when a Russian astronomer was the first to find it. It was discovered in 1889 and its number in astronomical records is 1889 V. It was seen in 1896, 1903, 1910 and 1925. This comet is famous for an encounter with Jupiter, before which its period was 29.2 years. At the time of its first appearance it was accompanied by four faint companions which appear to have separated from it later.

Brooks' comet is one of nine periodic comets that were expected this year. Of these five, including Brooks', have been seen so far. In addition, six new comets have been discovered so far. All of these have been too faint to be seen with the naked eye. Not for years has a spectacular, brilliant comet arrived for the entertainment of the public.

Science News Letter, October 8, 1932

METALLURGY

Gold in Small Percentages Detected by New Method

GOLD can be separated from silver alloys in which it is present as only one part in 300, by a new method devised by Dr. Heinz Borchers of the Electrometallurgical Institute of Aachen, Germany. This is a great improvement over the method at present in use, which cannot be relied on for accuracy when the ratio falls below one part of gold to three of silver.

Both methods depend on the fact that gold resists the action of acids that dissolve silver. The present method is to put the alloy to be analyzed into nitric

acid, and weigh the gold residue after the silver is dissolved. But gold in low percentages breaks down into a fine powder, exceedingly difficult to recover.

Prof. Borchers discovered that at moderately high temperatures the atoms of gold recombined into solid crystals of the metal. But high temperatures could not be used with nitric acid because of its low boiling point, which is only a little above that of water. However, sulphuric acid, which is easily able to dissolve silver, has a boiling point about three times higher, so that it can be used with good success.

Dr. Borchers' results are of practical interest to jewelers, dental technicians, and other metallurgical craftsmen, as well as of importance from the standpoint of pure chemistry.

Science News Letter, October 8, 1932

MEDICINE

Cancer Linked with Change in Centrosomes

CANCER may be linked with permanent changes in cell centrosomes rather than with abnormal behavior of chromosomes, in the opinion of Mrs. Margaret Reed Lewis and Dr. Warren H. Lewis of the Carnegie Institution of Washington and the Johns Hopkins Medical School in Baltimore. The studies on which this opinion is based were made with the aid of a special moving picture camera devised by Dr. Lewis, and are made public in the current issue of the *American Journal of Cancer*.

Centrosomes are tiny granules which are known to play such an important part in cell division that they are considered by some scientists to be the center of activity for that process. Scientists have held for some time that the difference between cancer cells and normal cells lay in the abnormal multiplication of the cancer cells. By studying moving pictures of the actual process of cell multiplication, or division, which is the same thing, in both normal and cancer cells, the Lewises hope to throw light on this phase of the problem.

Besides the change in the centrosomal apparatus, they saw the irregular behavior of chromosomes in cancer cells which other investigators had observed. They do not agree that the chromosome abnormalities are the cause of cancer, but suggest that these are one result of it.

Their studies were made on a rat cancer, known in scientific circles as Walker Rat Sarcoma No. 338.

Science News Letter, October 8, 1932

IN SCIENCE

MEDICINE

Leprosy Remedy Tried in Experimental Tuberculosis

CHAULMOOGRA OIL, used in the treatment of leprosy, is being tried as a remedy for tuberculosis induced experimentally in guinea pigs. Surprisingly good results in checking the course of the disease are reported by the investigators, Dr. Erik Ohlsson and G. Glimstedt of the Agricultural High School at Alnarp, to the *Swedish Chemical Journal*.

The experiments are still in progress and the scientists warn that it would be unjustifiable and objectionable to try the method on human beings before the investigations on animals have been definitely concluded.

Science News Letter, October 8, 1932

GEOLOGY

Only Speck of Rock Now Needed for Age Analysis

A MERE SPECK of rock, half of a crystal weighing a thousandth of an ounce, can now be microanalyzed to determine the age of the rock, Prof. Alfred C. Lane of Tufts College, chairman of the National Research Council's committee on the measurement of geologic time, has reported.

From Dr. Friederich Hecht of the University of Vienna he has received a report of a complex analysis of a tiny crystal sent by Prof. W. G. Foye of Wesleyan from a quarry near Middletown, Conn. Only 33 milligrams of material were used. Hundreds of times that quantity would be needed for an analysis made by ordinary methods. Such an analysis has already been made by Dr. C. N. Fenner, of the Geophysical Laboratory, of a different mineral, presumably about as old, and the late Dr. W. F. Hillebrand, formerly chief chemist at the U. S. Bureau of Standards, analyzed crystals of the same mineral.

The age of the quarry was determined as Devonian, an invasion of granite some three hundred million years ago.

Science News Letter, October 8, 1932

EX FIELDS

ASTRONOMY

Third Most Speedy Tiny Planet Discovered

A TINY PLANET, probably not over ten miles in diameter, that makes a trip in its orbit around the sun in 2.023 years, has been discovered independently by American and Russian astronomers. Of the 1,500 or more of these bodies, called asteroids, that revolve in the space between the orbits of Mars and Jupiter, only two encircle the sun in shorter periods, according to calculations made in Berlin by Dr. A. Kahrstedt, of the staff of the Astronomisches Recheninstitut at Berlin-Dahlem. The newly identified member of the solar system is designated as, 1932 PB.

Though the first observation of the asteroid to reach the Recheninstitut was made on August 4 by Dr. G. Neujmin, at the branch of the Russian Central Observatory at Simeis, in the Crimea, it was found previously by Dr. George Van Biesbroeck, of the Yerkes Observatory in Wisconsin, who first recorded it on July 30. Dr. Kahrstedt's computation of the orbit was made with the aid of four observations by Dr. Van Biesbroeck. At present the planet is in the constellation of Capricornus, in the southern evening sky, but is of the 12.7 magnitude, too faint to be seen except with a big telescope.

Science News Letter, October 8, 1932

PLANT PHYSIOLOGY

Autumn Leaf Colors Due To Complex Chemistry

GORGEOUS autumnal colors in woods and along roadsides are due to two general classes of chemical compounds in the ageing leaves: carotinoids and anthocyanins. The carotinoids are responsible for the yellows, and the anthocyanins for the reds and purples.

Dr. Charles E. Sando of the U. S. Department of Agriculture has summarized the process by which leaves turn from green to gay, when promises of frost begin to cool the air.

Carotinoid pigments are present in

all leaves, but are masked most of the time by the more abundant green coloring matter, chlorophyll. Chlorophyll is always being both formed and destroyed in leaves, but in autumn destruction goes on faster than formation, finally reducing it to a low point which permits the yellow carotinoids to be seen. If no other masking pigment is present, leaves become pure yellow or orange, like tulip-tree, willow and sassafras.

The other class of pigments, the anthocyanins, are dissolved in the cell sap. With the exception of a few purple-leaved or bronze-leaved plants, these pigments are also concealed by the more abundant chlorophyll, and show themselves only when it has been sufficiently broken down. At the same time, certain changes in the carbohydrate content of the leaves may cause an actual increase in the amount of the anthocyanins present. Thus we get the strong reds and purples of sumac, blackberry, sweetgum, the oaks, etc.

Science News Letter, October 8, 1932

CHEMISTRY

New Cheap Source of Vitamin A to Aid Research

CAROTENE, from which the body derives vitamin A, is now available to physicians and scientists at about half its former cost as a result of research conducted by Dr. A. F. O. Germann and Dr. Harold M. Barnett of the S. M. A. Corporation research laboratory in Cleveland.

Efforts to isolate vitamin A itself have been hampered by the scarcity and high cost of pure crystalline carotene, the provitamin A. This substance once cost approximately \$11,000 a pound. By the new process it is possible to sell it for research use at less than \$15 a gram. There are over 450 grams in a pound.

Besides providing scientists with a cheaper source of carotene for investigation, the new method of producing crystalline carotene will enable physicians to give it to their patients in addition to the vitamin A in the diet, as they now can give viosterol.

Vitamin A is necessary for normal growth, prevents the development of a certain type of eye disorder and has lately been said to have power to increase resistance to infections such as colds. It is found in cod liver oil and in a number of foods, chief among them being butter, carrots, cream, eggs, milk, spinach and watercress.

Science News Letter, October 8, 1932

ENTOMOLOGY

Butterflies Born in Cold Hairier than Warmer Kin

SWALLOW-TAIL butterflies born in the cold are hairier than insects of the same species that first see the light of day under kindlier skies. Thus reports Austin H. Clark of the U. S. National Museum, who has made a lifetime study of butterfly life in the Middle Atlantic States.

The common yellow swallow-tail butterfly has two or more broods a year in the region around Washington, one in early spring, one in late spring and possibly one in summer. The early-spring brood, which emerges while the air is still chilly, differ from their later brethren in size, form and color. They are smaller, slenderer, darker, and have a pronounced growth of hairs, which is lacking in the late-spring brood. Similar differences are observed also in the blue swallow-tail.

Across the northern half of the continent, from Alaska and British Columbia to Newfoundland, there is a variety of the yellow swallow-tail that has only one brood a year, and that brood is indistinguishable from the early-spring swallow-tails of the Washington region, in size, color and hairiness. Thus there seems to be a correlation between cold and form in butterflies.

Science News Letter, October 8, 1932

METEOROLOGY

Puerto Rican Hurricane Is Season's Most Intense

THE 120-MILE winds that ravaged Puerto Rico were a part of the most intense tropical disturbance of a season during which such West Indian hurricanes have become plentiful. Though its winds were fierce, they damaged only a comparatively small area, the forecaster at the U. S. Weather Bureau pointed out.

The present storm is the fifth West Indian hurricane of this season, according to the Weather Bureau. Three such disturbances usually occur in a year. The only other severe storm of this season did not strike land. It headed directly for southern Florida; but veered sharply from this course when only about 200 miles off land, and spent itself over the Atlantic. In contrast with the present hurricane, its force was felt over a wide area.

Science News Letter, October 8, 1932

CHEMISTRY

Some Elements of Group V

"A Classic Of Science"

Columbium Came From America, Tantalum and Vanadium From That Storehouse of Rare Elements, Scandinavia

Columbium

AN ANALYSIS OF A MINERAL SUBSTANCE FROM NORTH AMERICA, Containing a Metal Hitherto Unknown. By Charles Hatchett. Published in *Philosophical Transactions of the Royal Society of London*, MDCCCII (1802). Read November 26, 1801.

IN THE COURSE of the last summer, when I was examining and arranging some minerals in the British Museum, I observed a small specimen of a dark-coloured heavy substance, which attracted my attention, on account of some resemblance which it had with the Siberian chromate of iron, on which at that time I was making experiments.

Upon referring to Sir Hans Sloane's catalogue, I found that this specimen was only described as "a very heavy black stone, with golden streaks," which proved to be yellow mica; and it appeared, that it had been sent, with various specimens of iron ores, to Sir Hans Sloane, by Mr. Winthrop, of Massachusetts. The name of the mine, or place where it was found, is also noted in the catalogue; the writing however is scarcely legible: it appears to be an Indian name, (Nautneauge;) but I am informed by several American gentlemen, that many of the Indian names (by which certain small districts, hills, &c. were forty or fifty years ago distinguished,) are now totally forgotten, and European names have been adopted in the room of them. This may have been the case in the present instance; but, as the other specimens sent by Mr. Winthrop were from the mines of Massachusetts, there is every reason to believe that the mineral substance in question came from one of them, although it may not now be easy to identify the particular mine.

Description of the Ore

The external colour is dark brownish gray.

The internal colour is the same, inclining to iron gray.

The longitudinal fracture is imperfectly lamellated; and the cross fracture shows a fine grain.

The lustre is vitreous, slightly inclining in some parts to metallic lustre.

It is moderately hard, and is very brittle.

The colour of the streak or powder is dark chocolate brown.

The particles are not attracted by the magnet.

The specific gravity, at temp. 65°, is 5918. . . .

Remarks

The preceding experiments shew, that the ore which has been analysed, consists of iron combined with an unknown substance, and that the latter constitutes more than three-fourths of the whole. This substance is proved to be of a metallic nature, by the coloured precipitates which it forms with prussiate of potash, and with tincture of galls; by the effects which zinc produces, when immersed in the acid solutions; and by the colour which it communicates to phosphate of ammonia, or rather to concrete phosphoric acid, when melted with it.

Moreover, from the experiments made with the blow-pipe, it seems to be one of those metallic substances which retain oxygen with great obstinacy, and are therefore of difficult reduction.

It is an acidifiable metal; for the oxide reddens litmus paper, expels carbonic acid, and forms combinations with the fixed alkalis. But it is very different from the acidifiable metals which have of late been discovered; for,

1. It remains white when digested with nitric acid.

2. It is soluble in the sulphuric and muriatic acids, and forms colourless solutions, from which it may be precipitated, in the state of a white flocculent oxide, by zinc, by the fixed alkalis, and by ammonia. Water also precipitates it

from the sulphuric solution, in the state of a sulphate.

3. Prussiate of potash produces a copious and beautiful olive-green precipitate.

4. Tincture of galls forms orange or deep yellow precipitates.

5. Unlike the other metallic acids, it refuses to unite with ammonia.

6. When mixed and distilled with sulphur, it does not combine with it so as to form a metallic sulphuret.

7. It does not tinge any of the fluxes, except phosphoric acid, with which, even in the humid way, it appears to have a very great affinity.

8. When combined with potash and dissolved in water, it forms precipitates, upon being added to solutions of tungstate of potash, molybdate of potash, cobaltate of ammonia, and the alkaline solution of iron.

These properties completely distinguish it from the other acidifiable metals, viz. arsenic, tungsten, molybdena, and chromium; as to the other metals lately discovered, such as uranium, titanium, and tellurium, they are still farther removed from it. . . .

I am much inclined to believe, that the time is perhaps not very distant, when some of the newly-discovered metals, and other substances, which are now considered as simple, primitive, and distinct bodies, will be found to be compounds. Yet I only entertain and state this opinion as a probability; for, until an advanced state of chemical knowledge shall enable us to compose, or at least to decompose, these bodies, each must be classed and denominated as a substance *sui generis*. Considering, therefore, that the metal which has been examined is so very different from those hitherto discovered, it appeared proper that it should be distinguished by a pe-

QUININE

was isolated from Peruvian Bark in 1820. Pelletier and Caventou will tell how they did it

IN THE NEXT CLASSIC OF SCIENCE

RADIO

The Science Service radio address next week will be on the subject,

PERFUMES AND PROGRESS IN SCIENCE

by

Dr. Marston T. Bogert

Professor of Organic Chemistry at Columbia University

FRIDAY, OCT. 14

at 2.15 P. M., Eastern Standard Time

Over Stations of
The Columbia Broadcasting System

cular name; and, having consulted with several of the eminent and ingenious chemists of this country, I have been induced to give it the name of Columbium.

Tantalum

EXTRACT FROM A MEMOIR on the Properties of Yttria Earth Compared with those of Glucine; on the Fossils in which the Former of these Earths is Contained; and on the Discovery of a new Substance of a Metallic Nature. By A. G. Ekeberg. Published in The Philosophical Magazine, Vol XIV. London (1802).

THE FIRST PART of this memoir contains an account of some experiments, made by M. Ekeberg, to establish the difference between glucine and the earth discovered in the gadolinite, and called yttria or gadoline; but as the peculiar nature of each of these earths is already well known to chemists, it is here needless to repeat what has been already said on that subject.

As the other is interesting on account of its novelty, we shall lay before our readers the observations made on it by the author.

Though the mineral substance I discovered, says he, contains yttria, it could not be classed in a system of mineralogy as a species of earth, on account of the more abundant mixture it contains of another substance equally remarkable, and which must increase the class of metals, already very numerous. I found this substance in two fossils, obtained from different places; in one of them, it

was united with iron and manganese; and in the other, with the former of these metals and gadoline.

This new metallic substance is distinguished by its insolubility in all acids. The only re-agent which has any action on it is caustic fixed alkali. When subjected to heat with this alkali, if the mass be then lixiviated, it partly dissolves in the water, and suffers itself to be precipitated from that solution, by means of an acid—but without the precipitate being in any manner attacked, whatever be the quantity of the acid employed. When separated by the filter, and dried, it remains under the form of an exceedingly fine white powder, which does not change its colour even at a red heat. If the remaining mass be treated with acids, the same powder is obtained. Its specific gravity, after being brought to red heat, is 6.500. It is fusible by the blowpipe, by the addition of alkaline phosphate and borate of soda, but communicates no colour to the flux.

Exposed to a strong heat in a crucible, without any other mixture than pounded charcoal, it is reduced to a button moderately hard, having some metallic splendour at its surface, but a dull blackish fracture. Acids have no other action on this kind of regulus, but that of bringing it to the state of white oxide in which it was before. The circumstances of the reduction, as well as the

specific gravity of this singular substance, seem to assign it a place among the metals, and I have sufficient reasons for being persuaded that it is none of those already known. The substances with which it might be confounded are the oxides of tin, tungsten, and titanium, which are soluble in caustic alkalies, and which, under some circumstances, resist acids. But the oxide of tin is easily dissolved and reduced: tungsten immediately discovers itself by its solubility in ammonia, and by the blue colour which it communicates to phosphate of soda: the oxide of titanium gives a hyacinth colour to borax, and becomes soluble in acids by fusion with carbonate of potash.

Before I describe the chemical analysis which I undertook of the two substances, which I consider as ores of the new metal, it is proper I should give a description of their external characters. In order to avoid circumlocution, when necessary to name them I shall venture to give them a generic denomination. Taking advantage of the usage which admits mythologic appellations, and to express the property which the new metal has, of not becoming saturated with the acids in which it is immersed, I shall apply to it the name of *Tantalus*. For the ore composed of tantalus, iron and manganese I propose the name of *tantalite*; and for the ore containing yttrie, that (*Turn to next page*)

ENGINEERING

Pipe Filled With Sodium Used As Conductor of Electricity

FOUR-INCH iron pipe filled with the unstable metal sodium is a novel conductor of electricity that has been giving satisfactory service for several years in an electrochemical plant at Midland, Mich. It carries as much as 4000 amperes of current, a job that is almost universally done by copper.

The late Dr. H. H. Dow made the installation in an effort to prove that sodium could be used to better advantage than copper to conduct large direct currents. R. H. Boundy told the Electrochemical Society. Mr. Boundy believes that even now, with copper at its present low cost, use of the sodium conductors would be justified for certain installations.

Although the resistance of sodium is

three times that of copper, it weighs only one-ninth as much as the familiar electrical conductor. Hence, to carry the same amount of current, a sodium conductor has to be almost three times as large in cross-sectional area as one of copper. But a yard of the sodium conductor would not be nearly so heavy as a corresponding length of copper.

Sodium is one of the widely distributed of metals. A common form in which it occurs is table salt, chemically known as sodium chloride. The metal will not exist in nature as the uncombined element because air quickly tarnishes it and water readily reacts with it. As the pure metal, it is soft and silvery, with low melting point.

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of *ytrotantalite*, which will not be found longer than that of *siderotitanite*. . .

Vanadium

UEBER DAS VANADIN . . . (*On Vanadin, a new Metal, found in bar iron from Eckersholm, an iron foundry which gets its ore from Taberg in Smoland*); by N. G. Sefström. From *Kongl. Vetensk. Acad. Handl. f. 1830. Published in Annalen der Physik und Chemie (Poggendorff), Bd. XXII. Leipzig, 1831.*

MANY YEARS AGO the Bergmeister Rinmann devised a method for easily detecting whether an iron were cold-short, which depends upon the circumstance that such an iron upon etching with hydrochloric acid gives a black powder. On one occasion, when I needed an iron which was not cold-short, and for the purpose investigated iron from Eckersholm by this method, which I have described in the *Annalen des Eisencomtoirs* for 1825, S. 155., it gave, to my astonishment, the reaction for cold-shortness, although the iron from Taberg is considered the softest and toughest that we have. Time did not then allow me to clear up this behavior; but in April, 1830, I took up the investigation again, in order to see whether the black powder contained phosphorus, or consisted of some other material which it was important for me to know. Accordingly I dissolved a considerable amount of this iron in hydrochloric acid and examined the remaining black powder. During the solution the circumstance appeared that part of the iron, especially that setting free the black powder, dissolved faster than the rest, so that in the middle of the iron bar hollow veins were left.

Upon analysis of the black powder there were found in it silica, iron, alumina, calcium, copper, cobalt, and a substance which in certain respects resembled chromium and in others uranium. In what combinations these substances occurred could not be determined, since the small amount of black powder did not exceed 2 decigrams, and of this more than half was composed of silicic acid.

After several tests it was discovered that it was not chromium, and the following comparisons show also that it is equally unlikely that it is uranium. In this it is to be noted that the highest oxidation products were compared with one another, that, however, Vanadium resembles tellurium in its lower oxidation forms.

REACTIONS OF URANIUM OXIDE

Solution in Hydrochloric Acid

Color: pure yellow

Behavior with Ammonium Hydroxide

Gives a yellow precipitate, especially upon warming

With Ammonium Carbonate in Excess

Is precipitated on heating

With Potassium Ferrocyanide

Gives a brown precipitate

BEFORE THE BLOWPIPE

With large admixture of Borax

The yellow glass becomes colorless, but not the green

With Soda in the Oxidizing Flame

Does not dissolve in it

These reactions were later confirmed in the month of May in the laboratory of Prof. Berzelius. The metal was reduced by roasting in hydrogen gas, and it was thus discovered that it possesses a lower oxidation compound, giving with acids a blue-green solution, and that this as well as the higher oxide is soluble in alkalis.

A complete analysis could not be made at that time on account of other matters; and the small supply, amounting to less than 2 centigrams, was used up.

In the autumn the research was again taken up and then carried on in the laboratory of Prof. Berzelius. There the new metal was first isolated from the iron bars; but the yield even from several pounds of dissolved iron amounted to so little, that I procured a quantity of slag from the iron, from which I got a sufficient amount for investigation.

Name of the New Metal

Since this makes no difference to it, I have derived it from *Vanadis*, an alternate name of Freya, the most important goddess in Scandinavian mythology. . .

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Commercial dress pattern manufacturers have adopted 29 of the designs for children's clothing developed by the U. S. Bureau of Home Economics.

No perfect method of "moisture proofing" wood has yet been found, but government tests show that some coatings reduce the rate of moisture absorption materially.

REACTIONS OF VANADIN

Color: orange yellow

Gave no precipitate and with excess of ammonia the solution upon warming became colorless

Is not precipitated

Gave a green precipitate

The green glass may become colorless, but not the yellow

Is easily dissolved in it



Fruit of Vinland

THE FIRST light touches of frost are mellowing the sharp tang of the wild grapes, and in a thousand thickets and riverside tangles small boys and other boys not so small are putting purple linings in their mouths. Wild grapes are small and inclined to run to seeds, but there is some sort of atavistic appeal about their flavor that has somehow been bred out of their politer cousins of the cultivated vineyards.

There are a number of different kinds of wild grapes in the eastern part of North America, and all of them have their virtues. Two especially, the fox grape of the Middle Atlantic and New England states and the Catawba grape of the middle South, have contributed heavily to the ancestry of all the fine domestic table varieties. It was a wild grape, probably the fox grape, that left one of the strongest of early impressions of America: the Vinland of Lief, son of Eric, was so called because of its abundance of grapes.

Farther west, the smaller, more strongly flavored wild grape known variously as wolf grape and river grape has been less amenable to culture. It has been only within the last couple of decades that breeders out in Dakota have bethought them to cross it with the Concord, thus establishing a racy-flavored, medium-sized grape of tremendously rapid growth and extreme hardiness that will resist even the blizzards of the plains and western prairie lands. This is the Beta grape. Whoever does not have it in his vineyard or arbor is missing something which a true grape lover ought to know.

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SIR ISAAC NEWTON

His writings supply material for two Classics of Science.

Words of Famous Men

LIKE THEIR DEEDS, the words of famous men contain inspiration for most normal humans privileged to know them. Just imagine how thrilling it would be to turn the pages of history back to see for yourself the making of scientific discoveries that have changed the world—next best is to read of these achievements in the words of men whose names have become immortal—to get first-hand, information that reaches most people only after it has been rewritten from textbook to textbook.

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These Classics of Science, contained in antedated issues of the NEWS LETTER, may now be ordered by you from a convenient classified list. Read carefully the complete index on this and the next page. See how many great names it contains. Then note in the coupon the classics you would like to have, clip and mail with your remittance. Act promptly, the quantity is limited.

TEACHERS: Illustrations with the Classics (practically all carry one picture and some have two) increase their effectiveness for classroom use. Let your students see how the principles they are studying were first expressed by the discoverers. Stimulate their interest. Give them the thrill of the original.

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SEISMOLOGY

Quake Was Similar to One That Ruined Brilliant Knossos

Repeated Aftershocks Indicate Violence of Disturbance In Which Hundreds of Lives Were Lost on Coast of Greece

THE EARTHQUAKE that worked ruin in various Greek towns on Monday, Sept. 26, originated under the Aegean sea a little distance off the coast, according to calculations made by the U. S. Coast and Geodetic Survey and the Jesuit Seismological Association, based on data received by Science Service from a number of observatories.

The approximate location of the epicenter was in latitude 39.5 degrees north, longitude 24 degrees east, and the time of origin was 2:20.6 p. m., eastern standard time. All instrumental records indicated an earthquake of terrific violence, scientists of the Coast and Geodetic Survey said. Aftershocks continued to record themselves on seismographs in this country for several days after the principal disturbance. It is unusual for instruments so far away to record aftershocks, of even a severe quake.

An earthquake similar to this one is believed by many archaeologists to have been the ruin of one of the most brilliant civilizations the world has ever seen, which thrived over three thousand years ago on the nearby island of Crete. Knossos, its capital and chief cultural center, was blotted out suddenly about 1200 B. C., a hundred years or so after Tut-Ankh-Amon died in Egypt. The mighty ruins show evidences of the work of a terrific earthquake.

It may be that the earthquake itself did so much damage and killed so many of the people that the survivors were never able to rebuild their city, or it may be that they were so weakened and disorganized—perhaps by the wiping out of the ruling family—that they could not offer adequate resistance either to pestilence or to the marauding bands of sea rovers. Tyre and Sidon were tall cities even then, and the early Greeks on the mainland had learned how to build the ships that later carried them to the siege and sacking of Troy. In those lawless days all sailors were pirates, and a rich city broken open by an earthquake invited plunderers as a burst grape gathers wasps. Whatever happened, the earthquake came, and after it passed the

city of Knossos did not rise again.

Knossos had, however, survived earlier earthquakes, signs in its stones indicate. Crete, and indeed the whole eastern Mediterranean region, is an earthquake area of the first order, and the ancient Cretans had to repair damages caused by shocks several times during the centuries of their splendor. They had something worth repairing, too, for the palace of Minos, the great Cretan monarch, was one of the marvels of antiquity even in its ruins. Among other "modern" improvements it had bathtubs and an elaborate system of stone drains, some of which still function in carrying off rain-water, in spite of all the earthquakes that have shaken them.

Science News Letter, October 8, 1932

PHYSICS

Crystals to Be Studied at Extreme Low Temperatures

CREATION of extreme low temperatures to within 1.5 degrees Centigrade of absolute zero is to be undertaken this winter in a series of experiments that may lead California Institute of Technology physicists to the discovery of fundamental laws governing the internal structure of solid matter.

Dr. Alexander Goetz, associate professor of physics, visited Europe this

summer where he studied the technique of producing low temperatures.

Dr. Goetz anticipates that this frigid method attack will allow the study of the crystal structure of metals in their least disturbed state. This is considered essential to discovering fundamental laws, as the crystal structure is more or less disturbed at increasingly higher temperatures. The experiments are expected to have practical value in metallurgy.

Dr. Goetz also plans to observe how the disappearance of electrical resistance in the cold state will affect other electrical properties of metals.

To obtain the cold temperature that will approximate the coolness of interstellar space, he will employ helium liquefied under extremely high pressures.

Temperatures for the experiment will be stepped down from that of liquid air, 182 degrees below zero Centigrade, to liquid hydrogen that enjoys a chilly temperature of 250 degrees below zero.

It is hoped to obtain the first liquid helium by Christmas.

Science News Letter, October 8, 1932

SEISMOLOGY

Earthquake Shakes Sea Floor Near Japan

AN EARTHQUAKE very remote from the scene of destruction on the coast of Greece occurred at 12:45 p. m., eastern standard time, on Thursday, Sept. 29. The bottom of the Pacific ocean east of Japan was shaken, according to a tentative determination made by the U. S. Coast and Geodetic Survey on the basis of data obtained by Science Service. The approximate location of the epicenter was in latitude forty degrees north, longitude one hundred fifty degrees east.

Science News Letter, October 8, 1932

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• First Glances at New Books

Zoology

THE STANDARD NATURAL HISTORY—Edited by W. P. Pycraft—*Warne*, 942 p., 12 pl., \$6. One of the best-known of English zoologists has rallied a group of first-class colleagues to produce a solid, informative, abundantly illustrated natural history book, of the type we used to delight in but with the advantage of more up-to-date data. Although the temperate-zone forms described are (quite naturally) largely European, the authors have ranged the world for their other animals; and even the European flavor of some of the sections is not a real handicap, for many American forms are identical or quite similar.

Science News Letter, October 8, 1932

Astronomy

WONDERS OF THE SKY—Mary Proctor—*Warne*, 96 p., 50c. A handy little pocket-size book offering in attractive form the elements of astronomy, by an author who has already achieved a reputation as a popular writer.

Science News Letter, October 8, 1932

Biography

LEONARDO DA VINCI—Clifford Bax—*Appleton*, 160 p., \$2. A new, compact, quite readable biography of that remarkable figure who was in one man the whole Renaissance: scientist and engineer as well as painter and sculptor.

Science News Letter, October 8, 1932

General Science

HENLEY'S 'TWENTIETH CENTURY FORMULAS, RECIPES AND PROCESSES—Edited by G. D. Hiscox—*Henley*, xiv+809 p., \$4. A new and revised edition of a very well-known work that tells you how to make anything from Acid-Proofing to Yeast; an exceedingly handy book to have around the laboratory.

Science News Letter, October 8, 1932

Plant Physiology

RESPIRATION IN PLANTS—W. Stiles and W. Leach—*MacVeagh*, 124 p., \$1.50. A compact but comprehensive little monograph, which plant physiologists and biochemists should find very useful.

Science News Letter, October 8, 1932

Archaeology

ARCHAEOLOGICAL SURVEY OF EASTERN WYOMING—E. B. Renaud—*Univ. of Denver*, 91 p. This survey directed by Dr. Renaud led to the recording of

229 Indian sites, many of them prehistoric. An additional chapter of the report is devoted to some interesting and beautiful petroglyphs. Eastern Wyoming yields few of these examples of Indian art, but, under the Archaeological Minute Man plan sponsored by Science Service, Dr. Renaud investigated the remarkable pictures at Castle Gardens, central Wyoming, which are accessible only over very rough and uncertain trails. A number of illustrations are given.

Science News Letter, October 8, 1932

Biography

THE INGENIOUS DR. FRANKLIN—Edited by Nathan G. Goodman—*Univ. of Pennsylvania Press*, 244 p., \$3. Selected scientific letters of the American Leonardo, carefully edited and beautifully printed. As a source-book for American science as well as American history, this collection is invaluable.

Science News Letter, October 8, 1932

General Science

MAN AND HIS WORLD—J. H. S. Bosard and others—*Harper*, 755 p., \$3.50. This book was originally developed as a text for the required general survey course at the Wharton School of Finance and Commerce, but it has grown beyond its original intent into a volume which any person may profitably take up to get a comprehensive view of the world he lives in and his relation to it.

Science News Letter, October 8, 1932

Chemistry

ORGANIC CHEMISTRY—G. Albert Hill and Louise Kelley—*Blakiston*, 564 p., \$3. A comprehensive textbook of organic chemistry, suitable for use in a one-year college course.

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Engineering

THE NEW NECESSITY—C. F. Kettering and Allen Orth—*Williams and Wilkins*, 124 p., \$1. The New Necessity, in the definition of the authors, is automotive transportation. They tell the story of the development of the automobile, and venture into prophecy concerning its future. The book is one of the Century of Progress series.

Science News Letter, October 8, 1932

Botany

THE WILD-FLOWER Namer—Horace Taylor—*Author (Brookline, Mass.)*, 50c. Several scores of the more familiar wild flowers, separated into a spring and a summer list. Each list is so arranged that when it is covered with successive cut-out masks, which are keyed for color, petal number, leaf-arrangement and flower size, the only surviving opening will frame the name of the flower to be identified. It works most amazingly well. Everyone who loves flowers but does not know their names will find this device an excellent automatic "introducer." And every botanist who is constantly having to name flowers for his friends should buy it in quantity lots, in sheer self-defense.

Science News Letter, October 8, 1932

Photography

THE CHEMISTRY OF PHOTOGRAPHY—*Mallinckrodt Chemical Works*, 93 p., 50c. Although this is frankly an advertising booklet, the chemical information in it has been well gotten up and will be of much use to photographers whose technical knowledge of chemistry is limited. The book is now in its fifth edition.

Science News Letter, October 8, 1932

Science-Education

SCIENCE RELATED TO LIFE, BK. I WATER, AIR AND SOUND; BK. III MAGNETISM AND ELECTRICITY; BK. IV LIGHT, FORCES AND MACHINES—Frank Reh—*American Book Co.*, 181 p., 200 p., 200 p., 60c. each. For use as elementary science texts.

Science News Letter, October 8, 1932

Chemistry

ESSENTIALS OF COLLEGE CHEMISTRY—B. Smith Hopkins—*Heath*, 544 p., \$3.24. A comprehensive course, which is also comprehensible to the average college student.

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Biology

EVERYDAY PROBLEMS IN BIOLOGY—C. J. Pieper, W. L. Beauchamp and O. D. Frank—*Scott, Foresman*, 686 p., \$1.60. A well-thought-out, clearly written textbook for junior high school use.

Science News Letter, October 8, 1932

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